TESTER, VALVE, AVO, No. 1

SECOND TO FOURTH ECHELON WORK

NOTE : This information is provisional and is supplied for guidance pending the issue of more complete instructions. All errors of a technical nature should be notified in accordance with Tels. A 0[illegible].

METER AND SUPPLY UNIT

MECHANICAL ADJUSTMENTS AND REPLACEMENTS

1. To remove the unit from the case unscrew the eight 6 B.A. screws around the top edge of the case and the two 4 B.A. screws which secure the 9-point socket to the case.

Transformer replacement

2. A frequent cause of failure of this instrument is breakdown of the transformers. As these are not (at present) impregnated or waxed, the windings alone can be replaced, the existing laminations being packed into the windings. The windings alone are parts listed.

Movement removal

3. If the movement requires attention, i.e., if it is sticking or non-operative as a result of dirt or mechanical damage, it should be removed as follows :—

(*a*) Unsolder, at the tag panel which carries the 50Ω bobbin and rectifier, the leads from the moving coil.

(*b*) Unscrew the two 2 B.A. cheese-headed screws which secure the movement to the front panel.

(*c*) Remove the movement complete.

The process of repairing the movement is detailed in Inst. Z 414. The sensitivity of the movement should be 600μA and the resistance should be approx. 32Ω. This sensitivity is sometimes difficult to attain, however, and a figure somewhat higher for F.S.D. is permissible as adjustment can be effected on the swamp resistance (see para. 10).

Tests and adjustments

4. After effecting any necessary repairs to the movement, and making any other obviously necessary replacements or repairs, the following series of tests should be carried out, which will reveal any defects present and, with the aid of the circuit diagram, permit the repair to be effected.

Check of ANODE switch and supplies

5. Connect an Avometer on 400V, A.C. range between sockets 6A and 1C (see Fig. 1) with the SELECT ANODE at NORMAL. Measure the voltages with the ANODE switch at all positions from D to 250. The voltages at positions D and REC should be approx. 12V and 30V respectively. At all positions the measured values will be 20% to 30% above the figures engraved on the panel, this being to allow for transformer regulation.

Check of SELECT ANODE switch

6. Repeat the check for any one position of the ANODE switch with the SELECT ANODE switch at the remaining positions as follows :—

SELECT ANODE at

A2 — Avometer connected between 7A2 and 1C
D1 — „ 8D1 and 1C
D2 — „ 9D2 and 1C

These as reversed

Check of SCREEN switch and supplies

7. Connect Avometer on 400V, A.C. range between sockets 5S and 1C and measure the voltages at all positions of the SCREEN switch. The measured values should be within ±5% of the figures engraved on the panel.

Check of HEATER switch and supplies

8. Connect Avometer on 10V (and 100V), A.C. range between sockets 2H— and 3H+ and measure the voltages at all positions of the HEATER switch. The measured values should be within ±5% of the figures engraved on the panel.

Check of grid voltage and reverse—phase grid voltage

9. Connect Avometer on 10V, A.C. range between sockets 1C and 4G and confirm that there is 1V, A.C. present with the key switch in the NORMAL (upright) or MA/V (left-hand position).

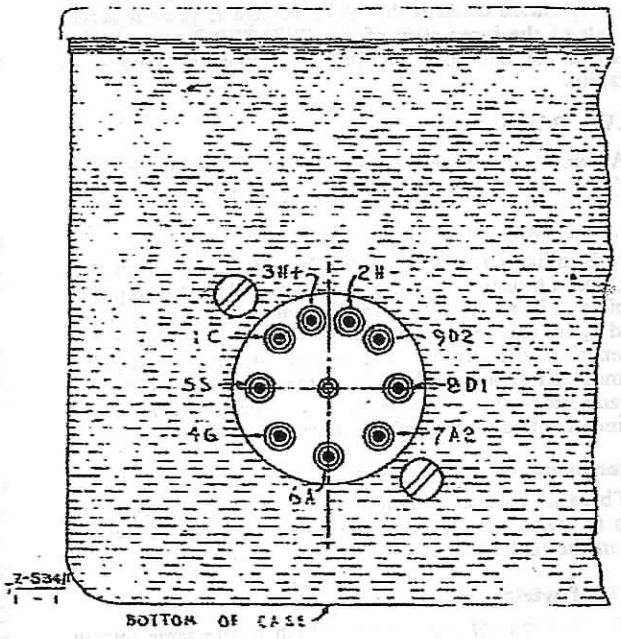

Fig. 1 — View of output socket on supply unit

Check of meter sensitivity

10. Unsolder, at the rectifier, the lead from the wiping contact of the SELECT ANODE switch to the rectifier. Take connections from the wiping contacts of the ANODE and SELECT ANODE switches to a series circuit comprising battery, variable resistor, and Avometer which has been standardized against a sub-standard meter. The battery and variable resistor should be chosen so that currents from 1mA to 100mA can be passed, and adjustment to the desired value effected with ease. Turn the SET MA/V control to the position marked 1, when F.S.D. on the meter of the valve tester should be obtained at 1mA±10%, as indicated by the Avometer. If adjustment is necessary, the value of the 40Ω (approx.) swamp resistor in series with the moving coil can be altered. As mentioned in para. 3, high sensitivity on the movement is often difficult to attain, and in such cases the value of the swamp resistor can be reduced to compensate for this. The highest possible value of swamp resistor should, however, always be aimed at so that calibration is not unduly altered by variation in temperature. The swamp resistor is wire-wound with Eureka wire on a fibre card and mounted above the SET MA/V control. Turn the SET MA/V control to the position marked MA/V when F.S.D. should be obtained at 10mA±5%. Adjustment, if necessary, can be effected by slight alteration of the value of the 9Ω shunt resistor, which is wire-wound on a fibre card mounted between the SET MA/V and SELECT ANODE. Check the sensitivity at other positions of the SET MA/V control between 10 and 1, when the F.S.D. in mA should agree with the setting, tolerance ±10%. Turn the SET MA/V control to the position marked 100 when F.S.D. should be obtained at 100mA±5%. Adjustment, if necessary, can be effected by very slight alteration of the 0.1Ω shunt resistor, which is wire-wound, next to the 9Ω shunt.

Check of SET ZERO Control

11. Replace the wiring, connect the instrument to the mains and confirm that this control operates satisfactorily. In case of non-operation confirm that A.C. voltage is present across the ends of the inner strip of the SET ZERO control, that the strips are not open-circuited, and that the rectifier is not faulty.

VALVE PANEL

12. Access to the panel is obtained by removing the four 6 B.A. screws on the underside of the panel case.

9-bank, 10-way, selector switch

13. It is unlikely that trouble will be experienced with this, apart from a broken escutcheon plate which should be replaced complete. The fixed contacts of this switch comprise 10 silver-plated $\frac{3}{32}$ in. dia. rods which are carried complete throughout the length of the switch. The wiping contacts are keyed to the moulded rollers and make contact between successive rods and fixed silver-plated contact rings brought out to form the line of soldering tags at the lower edge of the switch.

Replacement of valve holders

14. These are supplied complete with a bronzed brass ring which is pushed through the hole in the panel and rivetted over on the underside.

Check of wiring of valve panel

15. Put all banks of the selector switch to the same setting, as indicated by the white figures and letters. This means that all valve pin sockets of all valve holders are connected to the same supply line. Test for continuity between the appropriate pin on the plug (which is normally plugged into the meter and supply unit) and all valve pin sockets. The appropriate pins for the various settings of the banks of the selector switch are indicated by the letters in Fig. 2.

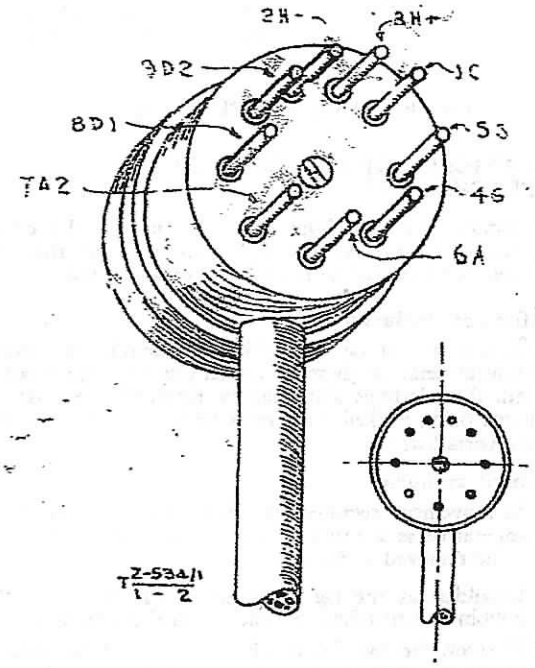

Fig. 2 — View of pin ends of plug

In the case of the sockets check for continuity as follows :—

A socket to pin 6A (Fig. 2)
G " " " 4G (Fig. 2)
S " " " 5S (Fig. 2).

COMPLETE INSTRUMENT

Check of ÷7 transformer on valve panel

16. Set pin No. 1 bank of the selector switch to 2H— and pin No. 2 bank to 3H+. Measure the A.C. voltage between pins 1 and 2 of any valve holder with the switch in the NORMAL position and confirm that this is divided by 7 in the ÷7 position. Conventional pin numbers on the various valve holders are given in Fig. 5.

Operational checks

17. Check the operation on the inter-electrode shorts test. Insert the test lead plugs into the sockets on the meter supply unit, which should cause the neon to go out. When the ends of the leads are touched together the neon should glow. Check the cathode-heater insulation test, using a known good valve. Operate the complete instrument as normally on several valves to confirm satisfactory working.